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DISCUSSION

FRANK B. GILBRETH

I wish to lay additional emphasis on what Dean Kimball said. He is a little bit too modest, or rather, he is in a position where he can't say to this audience what they would be interested in hearing, but he is the Dean of the Engineering School at Cornell, and is also President-elect of the American Society of Mechanical Engineers. He was selected from some fourteen or fifteen thousand of the mechanical engineers of this country to lead them this year in the great subject of industrial management, emphasized in our colleges.

Dean Kimball early in the history of modern industrial or scientific management wrote a book, which is used as a textbook in every organization where there are young men studying industrial management. In other words, the Dean is a leader outside of colleges, as well as inside of colleges, and I, as one of the minor representatives of the American Society of Mechanical Engineers, desire to emphasize that from the standpoint of professional engineers, what he told you is the gospel truth.

H. C. METCALF

I value highly the fine contributions of Mr. Gilbreth and Dean Kimball to the problems we are discussing. I hesitate somewhat to give expression to certain thoughts that are running through my mind. I hope, however, that what I have to say will not be misunderstood.

As one who has been something of a pioneer in the field of personnel administration, I doubt if anyone has taken more hard knocks in trying to help develop sound industrial relations during the past twenty years than I have.

I have followed with constant interest the development of the vocational guidance, the efficiency, the so-called "welfare" and the scientific management movements. Those of you who have been careful students of these various developments know that labor, and particularly organized labor, has never been over-enthusiastic about them, and that in the case of scientific management labor has at times shown an organized hostility toward the movement. In the light of my experience with these different movements, I feel a certain anxiety when I contemplate some of the statements of our good friends, Mr. Gilbreth and Dean Kimball. If I understand their meaning, they feel that the engineer is increasingly going to be the professionally trained man in industry who will most definitely be responsible for the *administration* of business. I think we all would have to admit that the problems of personnel are fundamentally a part of the administration of industry and inextricably a part of production. A good many engineers are now speaking of personnel work as a "human engineering" problem. My anxiety arises from two considerations. One, that in the light of past experiences, as revealed especially by scientific management, the human aspects of industry have not been adequately comprehended and cared for by the various groups of engineers—those whose primary functions have been dealing with materials and the laws of nature. As I see it, the technically trained engineer who is by native tastes, interests and specialized training best qualified to understand and direct the material problems of production is neither by nature nor by training the one best qualified to administer the human relations in industry.

We have at the very heart of industry the technical engineer whose position and importance cannot be over-emphasized in the industrial relations problems and who needs a certain amount of training in the sciences that are fundamental in the training of the personnel director. His work, however, has to do *primarily* with materials and the laws of nature—with mathematics, chemistry and physics—and only secondarily with the human factor. The personnel director, on the other hand, should have a special aptitude for understanding and working with people and his training should be fundamentally built up around a scientific method which will best be had from biology, industrial physiology, psychology and statistics; a social and historical background which will best be had from a study of elementary and advanced economics, history, political and social science, history of labor organizations and social psychology; and a technical training which will be secured from a knowledge of the organization and management of production and corporate general industrial organization. To these groups, I believe, the time is not far distant when there will be added formal training in ethics. "The greatest need of the world today is a keener *sensitiveness* with reference to the sense of justice." This, I take it, is fundamentally an ethical problem. In view, therefore, of what seems to me the necessary native background and scientific training for the technical engineer and the human social engineer, it is a mistake to look forward to the technical engineer as the one who is going to be the future administrator of business. The future administrator of business is going to be a professionally trained man. He will come from our graduate schools of business administration and not from our technical engineering schools.

In the industrial clashings a real conflict is going on between two groups of scientists: between those who are responsible for material production, processes and technique; and those who are responsible for the selection, placing, transferring promoting, rewarding and adjusting the human element in industry. Mathematics, chemistry, physics—the more exact sciences—are pitted against biology, psychology, economics, sociology and ethics. Not until the latter group of sciences becomes more exact and the two groups are more harmoniously blended, as I see it, can we hope to have true efficiency and fundamental harmony in industry. What we are striving for is a new type of scientist. Science means nothing except in so far as the different fields of science function through different types of individuals. What we want is a harmonious blending of the two groups of scientists through the understanding of a genuine human interpretation of industry.

DEXTER S. KIMBALL

I am afraid the last speaker missed my point altogether. I would remind you that I was invited to tell you what the technical schools could do. I laid no claim for the engineer as being especially fitted for this work. If you remember carefully, I expressed some anxiety on my part as to whether he could direct this work.

The point I wish to make is that whether you will it or not, the engineer will be the dominating figure in management. If he goes out of the university without some sympathy for these things, I say there is no hope, unless he is willing to recognize the type of man Mt. Metcalf speaks of. I made a claim for the fact that the engineer will be the industrial leader, and if he has not clearly in mind the importance of this great problem and the recognized fitness of having the other type of man labor on this problem, you are not going to get anywhere. I made no claims for the special fitness of the engineer, because I have some doubts myself.

FRANK B. GILBRETH

I would like to discuss that last question. I am going to disagree with my friend Metcalf whom I have known many years and for whose work I have high admiration.

I think that the engineer of the future is a measurer. The real engineers are going to be thought of as the men who measure, then add up their measurements in different sequences or combinations, and then arrive at the results of design and of action. I have been intimately connected with some really very refined measurements in human engineering recently, such as the times and motions of lip-reading; also data of skill for obtaining the One Best Way to Do

Work, such as measuring the lateness of the hands as compared with the eyes of individuals of varying intelligence, dexterity and skill in performing work. In motion study such refinements are necessary for determining the One Best Way to Do Work, and will be recognized as a vital part of the work of the engineer-educator of the future.

That surely will take care of Mr. Metcalf's point, which is well taken. It certainly will take care of Mr. Kimball's point, although I don't agree with him at all, that the engineer will not be able to handle this. In the past the engineer has possessed a type of mind suited to engineering. The engineer of the future will be that man and many others combined, who will seek the education that will enable him to measure, to select the proper units to measure, the proper methods of measuring, and the use of the proper devices which will permit the measurement and measuring to be accurate and cheap.

Therefore, to meet Mr. Metcalf's views, we will simply train the men of the type of mind of which Mr. Metcalf speaks, as well as the other kind of engineer of old, to use the modern devices, units, and methods of measuring to get the results that we want.

As I have said, I have had something to do with measuring the amount the hands are late as compared with the eyes in doing work, such as taking these things over there and putting them here on the bench. The amount the hands are late as compared with the eyes is an index of skill and the ability to learn mechanical processes. If the eyes are late as compared with the hands, it is an index of subnormality. If that is not the measurement of the human being, if that is not the first step in the standardization of human relations, if that is not the end of the scale in assuring that the workman is protected, then I shall have to back down from my position.

HARRY A. HOPF

Mr. Chairman, I want to address myself to just one phase of the work of schools, particularly technical schools, in dealing with undergraduates. It is part of my responsibility each winter to give several courses in management at one of the local universities. I have felt for a number of years that one of the very grave problems which we have to meet in that work is to teach the undergraduates how to market successfully the information they receive at the hands of the instructor.

In management, and perhaps in engineering and other courses, as well, it frequently happens that as a result of the instruction a student is lifted out of a rut (mentally speaking), and becomes dissatisfied with his present position. I have seen students go out year after year, for nearly seventeen years, from New York University; and, in the course of that time, have met many of those students who have made a failure of marketing the knowledge which they had attained in the schools.

And so it has come to be almost a fundamental truth to me that unless we can teach the student, in addition to the technical information we give him, something about management as a dynamic force in business, and something about approaching executives successfully and winning their support, we are largely failing in some of the chief results that we should hope to accomplish in our university work. So for my own part, I have tried for years to include in my courses in management at least a lecture or two on the principles of salesmanship, and many a student has come to me and said that those lectures had helped him a great deal.

I speak with conviction on the subject, because I am not only a member of the faculty of the School of Commerce, but also a graduate. The thing that puzzled me most in my early experience and caused me some of the worst tribulations and trials of my career, was the inability to market the information I had absorbed at school.

So I do wish to say on behalf of undergraduates, give them something other than technical knowledge, let them know what management means from the dynamic standpoint, teach them how to sell effectively and impress them with the value of personal relationships. When you do that you will be doing something very practical, for which those who are the beneficiaries will be grateful to you in after years.

FRED G. LANGE

Formerly Director of Safety, the Industrial Commission of Ohio

We have had quite a discussion this afternoon as to whether or not the engineer is going to dominate industry or whether a new force is going to come into industry, or whether or not the engineering colleges can teach something about the human side of industry in the four years that they usually allot to the teaching of engineering. The very fact that those years are not adequate to train engineers properly is evidenced by the fact that the engineers who are at the head of industry today are so mismanaging it, that safety engineers, efficiency engineers, and all these different types have come in. Had engineers been properly trained, whether it took five or six years, that movement might not have been necessary.

It was recently my pleasure as Director of Safety for the Industrial Commission of Ohio to address the students in the engineering colleges of our state on the relation of the engineer to accident prevention. In our state we have a thousand people killed in our industries every year, largely as a result of poor engineering, thoughtless engineering. And if the engineers had been given the proper perspective of the human side of industry in their college days, they would not have designed machines without guards for gears and belts; they would not have designed these things which maim and kill thousands and tens of thousands every year in this country. There is a total of 22,000 lives lost each year in the industries of this country—just think of it!

Are we going to be content to send our engineers out with such inadequate training? Are we going to send them out without some knowledge of the strains and stresses to which they can subject animate men and women as well as inanimate materials, bricks, steel and stone? Isn't it only fair that they should be given that viewpoint?

It may not be necessary to give the engineer—the mechanical engineer—an extended knowledge of industrial relations, but he must get the viewpoint of industrial relations.

There is a distinct new profession growing up—the profession of the personnel administrator — the man who studies the humanistic sciences, who is familiar with the experiments, not only in this country, but all over the world, looking toward better adjustment in industry. That is a distinct new profession, requiring services perhaps higher in type and ability than those of the men at the head of our industries today, because those men must know the problems of both management and men.

That distinct new profession is growing in this country. It is rising side by side with that of the engineers—the regular engineers—I will use that term. Now then, they will profit by the engineers' viewpoint, just as the engineer will profit by the humanistic viewpoint. And it is hand and hand together, marching on the path of progress, that we are going to find the solution of our difficulties—not in conflict.

HENRY HARAP

Graduate Student, Teachers College, Columbia University

Mr. Brown indicated the responsibility of the whole community in maintaining proper industrial relations. The knowledge, habits, attitudes and ideals necessary to meet this responsibility may be acquired in diverse ways. But the school is the special agency which should devote itself to the task of training the public in industrial harmony.

Instinctive conduct writ large dominates economic life. Economic life is characterized by the tendencies to acquire, to collect and hoard, to compete, and to master. These tendencies are woven into the accepted forms of economic organization. Indeed, the morality of the market-place is justified on the ground that it is a thing apart from the morality of private life. This spurious morality has its origin in the primitive tendencies associated with food-getting and shelter, from which it has only begun to develop in the direction of social ethics. In its modern form economic life is a social enterprise and demands a morality based upon the social instincts and principles. A genuine social conduct of business must result from the acceptance of new ethical principles and their crystallization in public opinion and control.

The school should cultivate the attitude of industrial harmony and cooperation. The school has long engaged in training for living in right relationships with people. Such training must be extended to meet the particular demands of the business world with which every child is to have some contact. It is for educators to decide whether they wish to prepare against destructive competition between employer and worker, between producer and consumer, between merchant and merchant, between manufacturer and manufacturer, etc. Many scrupulous men of business are forced into doubtful practices by the force of competition. Modern business is so distracted from its primary function that it regards competition as the chief impelling force of improvement and economy. How utterly false this is!

The school should train the body of future workers and employers so as to enable them to reduce industrial disputes and to settle peacefully what disputes are concerned with wages, hours of labor, and working conditions. The higher educational institutions should devote themselves constantly to the determination of proper standards of wages, hours and conditions. These standards should be thoroughly instilled in the minds of all who attend the public schools. These standards would be widely accepted and consequently would reduce industrial disputes.

The school should cultivate an attitude of group responsibility for the minimal essentials of life through employment for every one who wants to perform an economic service. Our present arrangements for the employment of men result in periodic want for a great number of families. Thousands of men who want to work are obliged to go idle and leave their dependents in want. Public conscience does not recognize that whatever the exigencies of the market or the fortunes of the employer, the one supreme factor in this world is human life. The members of our cooperative society for which the school will lay the foundation will not permit any of its members to suffer from dire want. In our present system this guarantee of continuous employment is dependent upon arrangements which employers or the government only can make. Whatever the industrial system may be, it must recognize that life is dependent upon employment and that life is the supreme factor. The same condition of group responsibility for unemployment should be accepted for accident and old age. We are dealing here with the development of attitudes which every socially-minded person will accept. We are not dealing with any particular form of social or political organization.

Dean Kimball and Mr. Metcalf have discussed the problem of training the future business administrator, industrial engineer, and personnel director. May I indicate a danger in their proposal? Both Dean Kimball and Mr. Metcalf have become habituated to thinking of the curriculum in terms of mathematics, physics, chemistry, economics, sociology and biology. Dean Kimball speaks of the "engineering type of mind" as if it were a distinct faculty which results from a study of the engineering subjects. As a matter of fact, the "engineering type of mind" is nothing more than a series of specific skills, habits and attitudes—good or bad, useful or useless, practical or theoretical, depending upon the quality of the content and instruction.

If the industrial engineer is to be of any service to society he must acquire special abilities and attitudes, not calculus, sociology or physics. The first task of the school for industrial engineers is to ascertain scientifically the specific needs of industrial engineering. The curriculum, then, consists not of subjects but of objectives of training for industrial engineering. The second task is the scientific selection of the content of the curriculum based upon these objectives. The third task is the scientific arrangement of the content for most effective learning. The final task is the scientific organization of the school factors for effective teaching.

In fact, it appears that the industrial engineers will have to cooperate with educational "engineers" in their problem of training men whose duty it will be to maintain harmonious industrial relations.

JOSEPH MAYER
Engineer and Economist

The thought that I would like to convey grows out of the two viewpoints that have been expressed with regard to industrial relations, the engineering and the economic.

Probably an illustration will serve best to introduce the few remarks that I have to make. You have all heard the old story, I think, of the blind men who made a visit to the zoo to study the elephants. One of the men happened to catch hold of the elephant's trunk; another rubbed his hand up and down his leg; a third one came in contact with the elephant's ear; a fourth one with his body, and the fifth got hold of his tail. The result was that when they began to discuss the elephant, each had a different conception. One said he was very much like a snake; another, like a tree; the third said he must be very much like a fan; the fourth said that he was reminded of a wall; and the fifth, that the elephant must resemble a rope.

This problem of industrial relations is a new one. It is old as the hills in one sense, but from the standpoint of our knowledge of it, it is relatively new. I think that the various viewpoints expressed here ought to bring us to a better realization that there are various sides to the problem. There is undoubtedly an engineering side, and it has been well expressed.

Pardon a personal reference. I started out as an engineer and became a member of the A. S. M. E. I have also a degree in economics, which I decided to take up later. And probably you will smile when I say this: I felt after studying both and having had considerable experience in industrial work that I should like to take up law. I will tell you the significance of that in a moment. In industrial relations the human engineering and the human relations side of industry—whatever you want to call it—is something which will undoubtedly hold our attention in the next ten years more than it ever has.

As I see it now, there is, in addition to an ethical and economic aspect of the whole problem, and an engineering side, a distinctly legal side. You have on the one hand organized labor, with its legitimate desires to further the weal of the laboring man, help make his conditions better, and so forth. On the other side there are employers or groups of employers who have other aims at heart, although we are told time and again that the aims are the same on both sides.

Doubtless, cooperation is a keynote of the best relations in industry, but in the strike of the milk drivers we have a good illustration of the real practical problems that we face, between labor on one side and capital or the employers on the other. There are agreements which when they are made, probably one side or another looks upon as a mere makeshift, feeling they will be broken anyhow.

We should realize that if we are going to look at the problem of industrial relations from all angles, we should appreciate the need of the legal type of mind as well as other types. The man who will look at the problem from the standpoint of justice and right must be trained to look at things from that angle and to look beyond the emotions of both sides. He is the man who can arbitrate and conciliate, because if there is one thing more than another that the future must hold forth in this organized warfare, it is the idea of arbitration and conciliation between the two big groups — these groups which are in one way or another warring against each other.

When the time comes that we can set up either voluntary or official boards to take over these matters of dispute and settle them, we will go a long way toward establishing the industrial peace that we talk about. Agreements must be kept. When an agreement is broken, the resulting rancor is difficult to remove.

When the time comes that these agreements will be made in good faith and kept in good faith, and when, if any further questions arise, they can be arbitrated, and when decisions of the arbitrators will be felt by everyone, including the public, to be just and fair, then we shall have taken another big step in the direction of permanent industrial peace.